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New Transition Forms or "abs" and their Classification (Lepid., Rhopalocera).

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(With Plate II)

With reference to classification of Lepidoptera in America, I believe we consider a *species* as a prime group of individuals reproducing their own in kind. When a segregated nearby group or a separate far-away group is discovered whose individuals are constantly similar to, yet consistently atypical of, a prenamed group, we term this newer colony a *race*. The words race, variety and perhaps subspecies seem to be identical. Our modern check lists have shunned the old phrase subspecies: variety is somewhat vernacular and used too often in the popular collecting sense of signifying anything different, while race is definitely conclusive and self-explanatory, hence it has a more justifiable acceptance for scientific record and parlance. If existing along with and bred within a species or within a race, are found frequently and continually, deviating individuals which are, as a rule, practically counterparts of one another, then these kinds are called *forms*. Forms may be seasonal, sexual and I might say, evolutionally fixed. Individuals which occur irregularly within a species or within a race and which by change of color or by change of pattern graduate with persistent characteristic similarity from near parental type up to definitely limited variation away from the parental type are called *transition forms*, or are more generally known as "aberrations" or "abs."

The word "aberration" and its slang concept "sport" have always seemed to me to be early entomological misnomers. Their position in the classification of Lepidoptera is certainly not generally understood and their continued long usage, in place of the phrase "transition form," has led some collectors to

the belief that such specimens are like "freaks" of a "never-to-occur-again" type; whereas, "freaks" have a very different and definite status compared to transition forms. "Freaks" are rarely occurring malformed specimens which depart in some striking manner from their co-constituents due to harmful external agencies. For example, "freaks" are such specimens as: dwarfs (*Cyn. cardui minor* Ckll.); venation malformations (*Dryas cybele bartschi* Reiff. and *Dryas coronis baroni* Edw.); chrysalis burns (see note under No. 11 specimen described herewith); monstrosities and all other ill formations due to a host of unusual causes. Such specimens should not be named and have no place except it may be in the synonymy of their kind for record. Perhaps some day a "butterfly medical book" will appear to cure all ails for the little dears, so at that remote time, a classification of "freaks" will be in order!! Regarding *hybrids* it has been the custom to give names designating the different states of relationship in successive generations by graphically and numerically demonstrating the relationship of two parental lines. The scientific value of these records, made mostly among moths, remain to be seen, as more has been done in Europe than in America with these experiments. Very few hybrids exist by name in our catalogues of diurnals and these will probably be left in *statu quo* for some time to come.

Transition forms or "abs." are of great biological significance. By the frequency of their appearance, one genus may be said to be in a more rapid state of evolutionary change than another. By the aberrant design or the cycle of their color transition, one may foretell what their future withholds or what their past has hitherto left unveiled. Work on these forms can hardly be said to have commenced and the real need at the present time is to classify them into like groups. This would save a piling up of names in the future, fix present types, and at the same time form a basis of real identification.

Regarding "ab." names. At the present time they are named by their degree of aberrancy; for example, if one row of spots on a specimen was absent, that individual received a name; if

two rows were absent on another like specimen, it also was given a name; if all the rows of spots were gone on a third specimen, that too was given a title. It is easy to see that all these specimens should be listed under *immaculism*, for they all vary in a like manner, only in different amounts, by degrees. Demonstrating my contention still further: if a specimen was partly black-shaded, on either wings, it received a name; if the upper wings only were all black on another, it got a name; if the lower wings only on still another were all black, it too was christened; and if again still another like specimen was found which was black all over, it was thought quite right to give it a special designation. But all these specimens should fall under one heading, to wit: *melanifusism*, and the name of the first named specimen, regardless of its degree of aberrancy, should, by right of nomenclatorial priority, represent this grade of transition forms, with all other names following in its synonymy. The *Nymphalinae* group show many "abs." listed and under proper classification these names will have to be dealt with in the future something like the following *Euphydryas* species, to wit:

Present Listing—

EUPHYDRYAS

- No. 204 chalcidona (*Dblidy. & Hew.*)
ab. fusimacula (*Barnes*)
grundeli (*Cool.*)
ab. lorquini (*Oberth.*)
suprafusa *Comst.*
ab. supranigrella *Comst.*
ab. fusisecunda *Comst.*
ab. hemimelanica *Comst.*
ab. mariana (*Barnes*)
ab. omniluteofusca *Gunder*
ab. hemiluteofusca *Gunder*

Future Listing

EUPHYDRYAS

- No. 204 chalcidona (*Dblidy. & Hew.*)
tr. form omniluteofusca *Gunder*
hemiluteofusca *Gunder*

- tr. form fusinacula* (Barnes)
lorquini (Oberth.)
grundeli (Cool.)
suprafusa Comst.
fusisecunda Comst.
tr. form mariana (Barnes)
supranigrella Comst.
hemimelanica Comst.

I find that all transition forms definitely divide into two general divisions, those which have "Change of color" and those which have "Change of pattern." There must have been "color" before "pattern," so I place it first, and arrange the sequence of order beginning with black in one and ending with black in the other. Thus:

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| | 1. melanism (<i>to black</i>) |
| Change of color—
(<i>pigmental</i>) | 2. chromatism (<i>to any spectrum color</i>) |
| | 3. albinism (<i>to white</i>) |
| | 4. pellucidism (<i>to no color, iridescent</i>) |
| | 5. immaculism (<i>lacking design</i>) |
| | 6. Albifusism (<i>white radiation</i>) |
| Change of pattern— | 7. chromatifusism (<i>color radiation</i>) |
| | 8. melanifusism (<i>black radiation</i>) |

The fact of color is the main thought to be kept in mind in an "ab." classification scale. Insects at the equator have practically acquired all the pigmental spectrum colors, while those in our temperate zone are either losing or gaining their share; so color change is a relatively frequent phenomenon among our American diurnals, as is maculation change, though it is less generally understood, there being so many hereditary complications. I have before me upper and under side photographs of 95% of the listed American "ab." types and I find they all fit easily into the above classification. No one species on earth at the present time can have representatives in all eight of the above divisions; even our most aberrant and commonly collected species among the *Euphydryas* can have at the most only three of four, possibly five, representatives in the cardinal grades. Each genus varies in this regard.

The numbers of the figures on Plate II correspond to the numbers placed in front of the species in the text. The size of all the specimens on the plate has been slightly reduced. I have adopted the abbreviation *tr. form.* for transition form, in place of "ab." not only for all the above given reasons, but because it gives to these new specimens and their predecessors an entomological rating more in accord with their true position; a rank by name which they have not held heretofore.

1. *Lycaena editha* Mead (fig. 1a, ♀), *vanduzeei* ♀ nov. *tr. form* (fig. 1).

Upper side. Primaries: normal, except for total absence of submarginal row of round black spots. Secondaries: as in primaries, this submarginal row is lacking except for a remnant or spot of reduced size opposite cell.

Under side. Normal. Maculation unchanged.

Classification: Transition form; immaculism; well developed degree.

Data: Holotype ♀; expanse 30mm.; Deer Park, Placer County, California; Type in coll. of the Calif. Acad. of Science, San Francisco, Calif. Named in honor of E. P. Van Duzee, San Francisco.

2. *Cynthia virginiensis* Dru., *simmsi* ♀ nov. *tr. form* (fig. 2).

This specimen is a parallel of *Cyn. cardui*, *tr. form clymi* Ramb. (half-fig. 2a) and of *Cyn. carye*, *tr. form muelleri* Letch. (half-fig. 2b) in that the region on both upper and under sides of the primaries near the costal margin from the cell is dark with apical white spots fused inward and the lower half of the wing above the inner margin is a clear, normal, red-brown color and free of the usual black designs. The veins of the upper side secondaries are more heavily darkened, especially through the limbal area; the round colored spotting is somewhat blurred; and the lines adjacent to the outer margin indistinct or lacking. On the under side of the secondaries, the ground color of the basal and discal areas is entirely blackish with only the white veins showing, very little of the complicated lattis-work designs in evidence; the two round spots are normal, perhaps somewhat blurred; the lines parallel and near to the outer margin absent or blended.

Classification: Transition form; melanifusism; degree very near final.

Data: Holotype ♀; expanse 52+mm.; Montreal, Canada, Sept. 12, 1913. (H. M. Simms); in coll. of H. M. & F. H. Simms, Stourbridge, Wor., England, to be donated as a gift to the British Museum, London, as its permanent future depository. One paratype ♀, (a lesser degree of *melanifusism*); Raleigh, North Carolina, 1898; in coll. of Am. Mus. of Nat. Hist., N. Y. Named for Mr. Harold M. and F. H. Simms, Stourbridge, Wor., England.

Note: The holotype specimen was mentioned, but unnamed, by Mr. H. M. Simms in the Ent. News, Vol. XXV, p. 33, 1914.

3. **Euphydras chalcedona** D. & H., race **olanchna** Wright (fig. 3a, ♀), **malcolmi** ♀ nov. tr. form (fig. 3).

Rows of white spots on both primaries and secondaries of both wings elongated and fused or run-together through their respective interspaces, especially in the discal areas. Similar, for example, to *Euphy. phacton*, tr. form *superba* Stkr. or *Euphy. chalcedona*, tr. form *fusimacula* Barnes, only in a less aberrant degree.

Classification: Transition form; albifusism; semi-final degree.

Data: Holotype ♀; expanse 44mm.; Casa Diablo, Mono County, California, June 22, 1925; in coll. of Author. Named for Mr. Geo. Malcolm, Los Angeles, Calif.

4. **Junonia coenia** Hbn., **wilhelmi** ♂ nov. tr. form (fig. 4).

Typical specimens generally have two spots or ocelli on the upper side of the secondaries. This specimen only has one. The upper spot remains while the lower spot has entirely disappeared, otherwise the specimen is normal on both sides.

Classification: Transition form; immaculism; typical specimens are so constant regarding disappearance of spotting (not irregular spotting) that it is doubtful if a much further degree of immaculism will occur.

Data: Holotype ♂; expanse 44mm.; Los Angeles, California, Sept. 15, 1910, (Schrader); in coll. of Author. A paratype ♀; Los Angeles, Calif., Oct. 15, 1913, (Schrader);

in coll. of Los Angeles Museum, Los Angeles, Calif.; this paratype ♀ is well illustrated in the Bull. So. Calif. Acad. of Sci., Sept.-Dec. issue, 1926, pl. 1, fig. 9. Named in honor of Mr. Wilhelm Schrader of Los Angeles who has been experimenting with the *Junonia* group for years.

5. *Phyciodes orseis* Edw., *edwardsi* ♀ nov. tr. form (fig. 5).

Upper side. Discal and basal areas of both wings melanic inward from submarginal row of roundish red-brown spots (this is the first row following the lunate row at outer margin); reddish cell spotting slightly in evidence through this darkened area.

Under side. Normal, except for slight fusing of color through inner-half area on primaries.

Classification: Transition form; melanifusism; semi-advanced degree.

Data: Holotype ♀; expanse 38mm.; labeled California, no date given; in coll. of Wm. Paines, Decatur, Illinois. Named in honor of W. H. Edwards.

Note: Normal specimens of this species, together with this tr. form (unnamed) are shown in Comstock's "Butterflies of California."

6. *Euptoieta claudia* Cram., *dodgei* ♀ nov. tr. form (fig. 6).

Upper side. Primaries: cell spots enlarged and wholly black; row of normally lighter colored spots through center discal area become row of corresponding black shaded spots; lunate row and lines at outer margin fused black and not clearly cut. Secondaries: lines at outer margin which normally form clear cut lunate spots become broad, forming fused row of softly shaded spots; just following these, an area of dark fuscous which formerly comprised the position of the round black spots of normal specimens; all spotting of inner-half slightly blurred.

Under side. Primaries especially correspond with the change occurring on the reverse side, in having the cell spots entirely black and with the black row through the discal area. The maculation of the secondaries is slightly blurred, otherwise normal.

Classification: Transition form; melanifusism; of a sufficiently advanced degree to show the tendency of this type which is rare for such a constant species.

Data: Holotype ♀; expanse 60mm.; near Scribner, Dodge County, Nebraska, July, 1885; type in the coll. of Mr. E. A. Dodge, Santa Cruz, Calif., who at a later date may deposit same in the Acad. Coll. at San Francisco. I am pleased to name this specimen in honor of Mr. Dodge of Santa Cruz.

7. *Lemonias alma* Stkr. (fig. 7a, ♀), *koebelei* ♀ nov. tr. form (fig. 7).

Corresponds precisely with *Lem. fulvia*, tr. form *sinefascia* Wms. in lacking all transverse submarginal black lines on under side primaries and submarginal black spot-enclosing band on under side secondaries; however, the cell and basal area maculation remains the same except for absence of heavy black line reaching costal margin on under side secondaries. On the upper side the specimen is normal except for a slight suppression of white maculation throughout the yellow-brown color.

Classification: Transition form; immaculism; degree final as in *Lem. leanira*, form *obsoleta* Hy. Edw. for example.

Data: Holotype ♀; expanse 36mm.; Argus Mts., Inyo County, California, April, 1891; in Koebele coll. at Acad. of Sci., San Francisco, Calif. Named for the late Mr. Koebele of San Francisco.

Note: Regarding the species, it is to be remembered that *Lem. alma* Stkr. has the sub-basal black band, whereas *Lem. fulvia* Edw. is without this maculation. Their aberrations therefore differ in this respect.

8. *Euphydryas bernadetta* Leuss. (fig. 8a, orig. ♂ paratype #9), *leussleri* ♂ nov. tr. form (fig. 8).

Rows of white spots on both primaries and secondaries of both wings elongated and fused or run-together through their respective interspaces, especially in the discal areas. Similar, for example to *Euph. phacton*, tr. form *superba* Stkr. or *Euph. chalcona*, tr. form *fusimacula* Barnes, only in a less aberrant degree.

Classification: Transition form; albifusism; semi-final degree.

Data: Holotype ♂; expanse 37mm.; near Harrison, Sioux County, Nebraska, June 5, 1919; in coll. of Mr. R. A. Leussler, Omaha, Neb. Named in honor of Mr. Leussler who first discovered this species.

9. *Dione vanillae* L., race *insularis* Mayn. (part-fig. 9a, ♀),
fumosus ♀ nov. tr. form (fig. 9).

Occasionally specimens occur, more often among females, where the color of the wings is a decided brown instead of the normal yellow reddish-brown. This pigmental change of color is more noticeable on the primaries and outer-half of secondaries; the inner-half of the secondaries along the costal margin retains the normal shade with perhaps a more reddish tint. All maculation remains unchanged.

Classification: Transition form; chromatism (color change from red-brown to brown, the next stage of which would be to black).

Data: Holotype ♀; expanse 77mm.; Los Angeles, Los Angeles County, California, Sept. 15, 1910; in coll. of Author.

Note: Western specimens seem to have this color change more than those from the East. Seitz in his Am. text says some So. Am. specimens are seasonal forms in this regard.

10. *Danaus menippe* Hbn. (cut-fig. 10a, ♀), *americanus* ♀
nov. tr. form (fig. 10).

Upper side. Distinguished from typical specimens on the primaries by having the veins very broadly black practically enclosing their interspaces. The ground color of both wings is a more yellow-brown, instead of red-brown and on the primaries this ground color is darker, being shaded over lightly with black scaling. On the secondaries, the ground color is generally lighter through the basal area and adjacent to the inner margin.

Under side. Ground color of primaries darker. Maculation unchanged.

Classification: Transition form; melanifusism; degree evidently near final, paratypes and others examined being similar.

Data: Holotype ♀; expanse 90mm.; Sunny Glen Ranch, Brewster County, Texas (Poling), July, 1926; in coll. of Author. One paratype ♀; Evanston, Illinois, 1905; in Comstock coll. at Los Angeles Museum, Los Angeles, Calif. (illustrated in Butterflies of California, pl. 17, f. 3, but erroneously labeled *fumosus* Hbst.) One paratype ♀; Provo, Utah (Spalding), July 26, 1909; in Barnes coll., Decatur, Illinois.

One paratype ♀; Santa Cruz, Calif., Oct. 15, 1917; in coll. of E. A. Dodge, Santa Cruz, Calif. The Monarch Butterfly is a native of North America, hence the appropriate designation of *americanus*.

11. (not illustrated) **Danaus menippe** Hbn., **nivosus** ♂
nov. tr. form.

The ground color of this specimen is entirely white on all surfaces, no red-brown in evidence. The maculation, veining, etc., remain unchanged and are as in all typical specimens.

Classification: Transition form; albinism; color change final.

Data: Holotype ♂; expanse 87mm.; Jefferson Barracks, Missouri, Aug. 21, 1908; in coll. of Author. A paratype ♀; Mt. Lebanon, Allegheny County, Pennsylvania, Oct. 2, 1921; in coll. of Carnegie Museum, Pittsburgh, Pennsylvania.

Note: I have examined syn. *pulchra* Stkr. at Field Museum, Chicago, and recently Mr. Gerhard kindly sent me photographs of both upper and under sides of it. This specimen is correctly synonymized with the species because the pattern of its partial white color malformation is of irregular disposition on the wings due to chrysalis burn, a malady probably affecting the pupa during its latter stage which results in mal-disposition of the pigmental fluids. I also recently examined *fumosus* H1st. at the Brooklyn Museum, Brooklyn, N. Y., and find it to be a perfectly good type for chromatism, a natural change of color to a darker or different shade. There are a number of examples of *fumosus* H1st. around the country in collections and I have a fair one in my own. In naming the above nov. tr. form *nivosus*, I have taken into consideration the chance of artificial modification, such as bleaching or fading; neither of these two type specimens exhibit either of these indications. The Pittsburgh paratype was freshly caught and later personally mounted by Mr. Kahl. Albinism is of course a thousand times more common among the *Eurymus* for example, than it is among species of other genera.

For explanation of Plate II, see page 133, lines 1-3.